Structure & Dynamics of the ImageTaskGang Application

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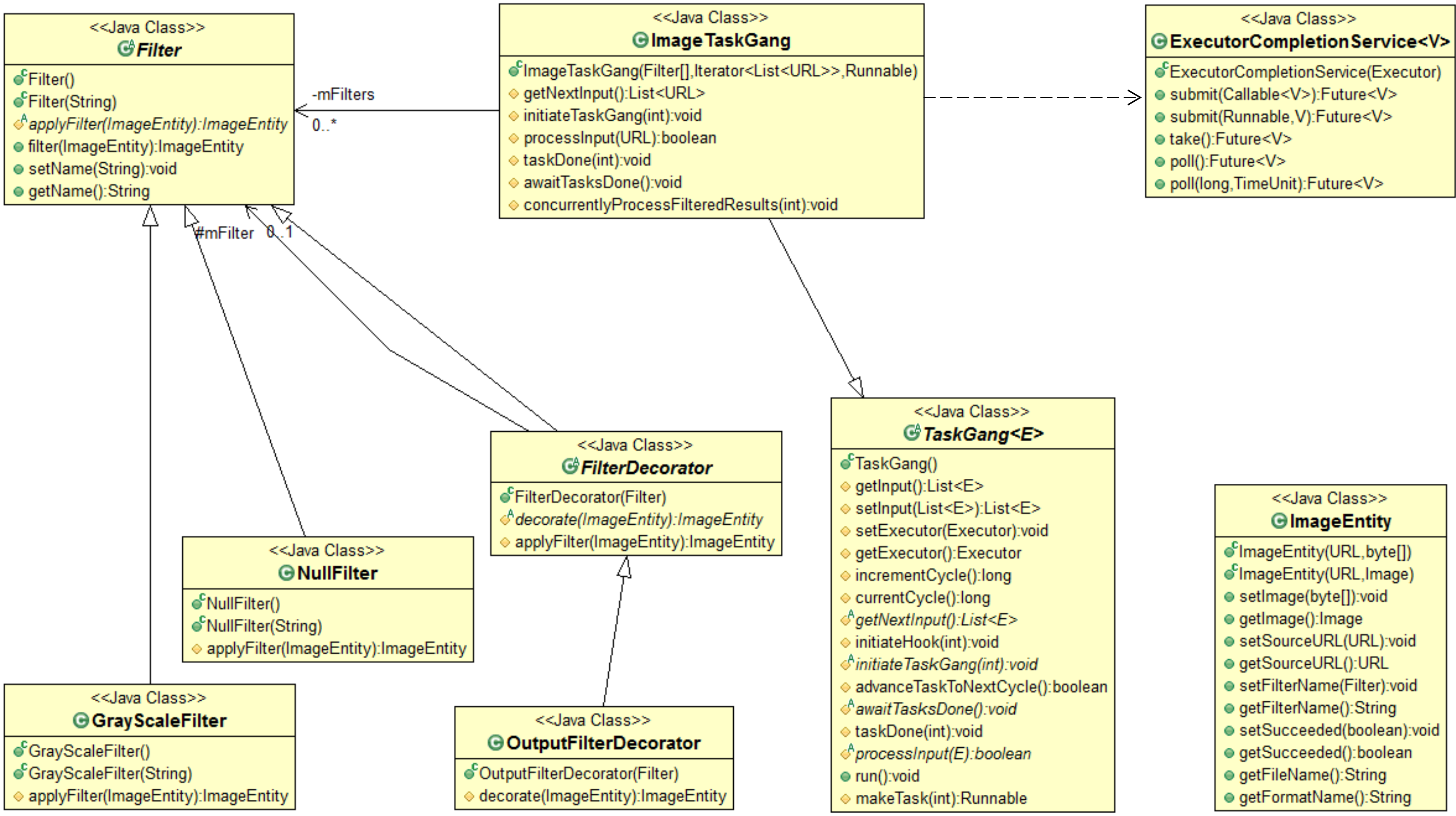
Learning Objectives in this Part of the Lesson

- Understand the structure & dynamics of the ImageTaskGang applications

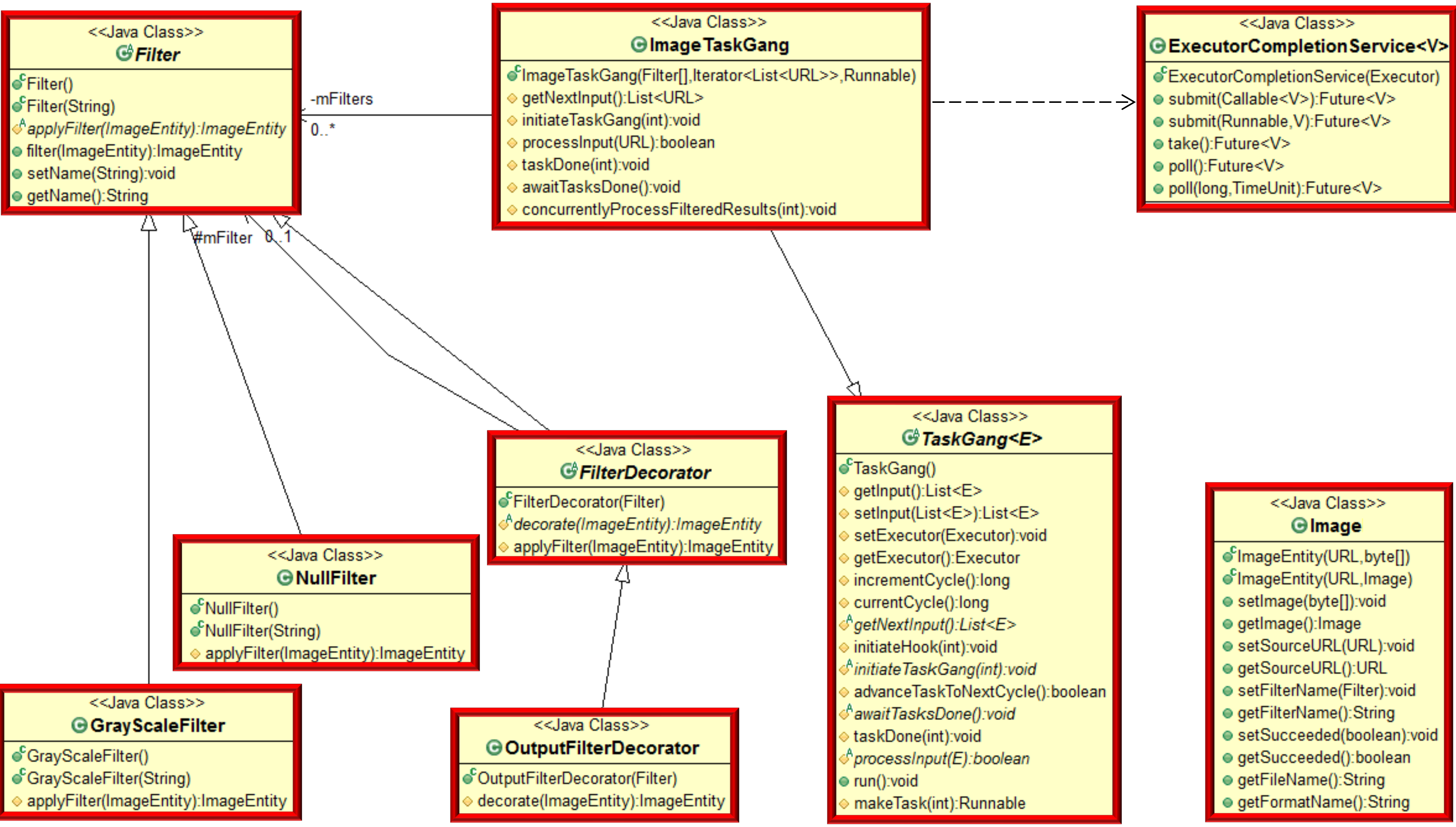


See github.com/douglascraigschmidt/LiveLessons/tree/master/ImageTaskGang

The Structure of the ImageTaskGang Application

The Structure of the ImageTaskGang Application

- UML class diagram for key components in the ImageTaskGang application



These classes implement the application's concurrency engine

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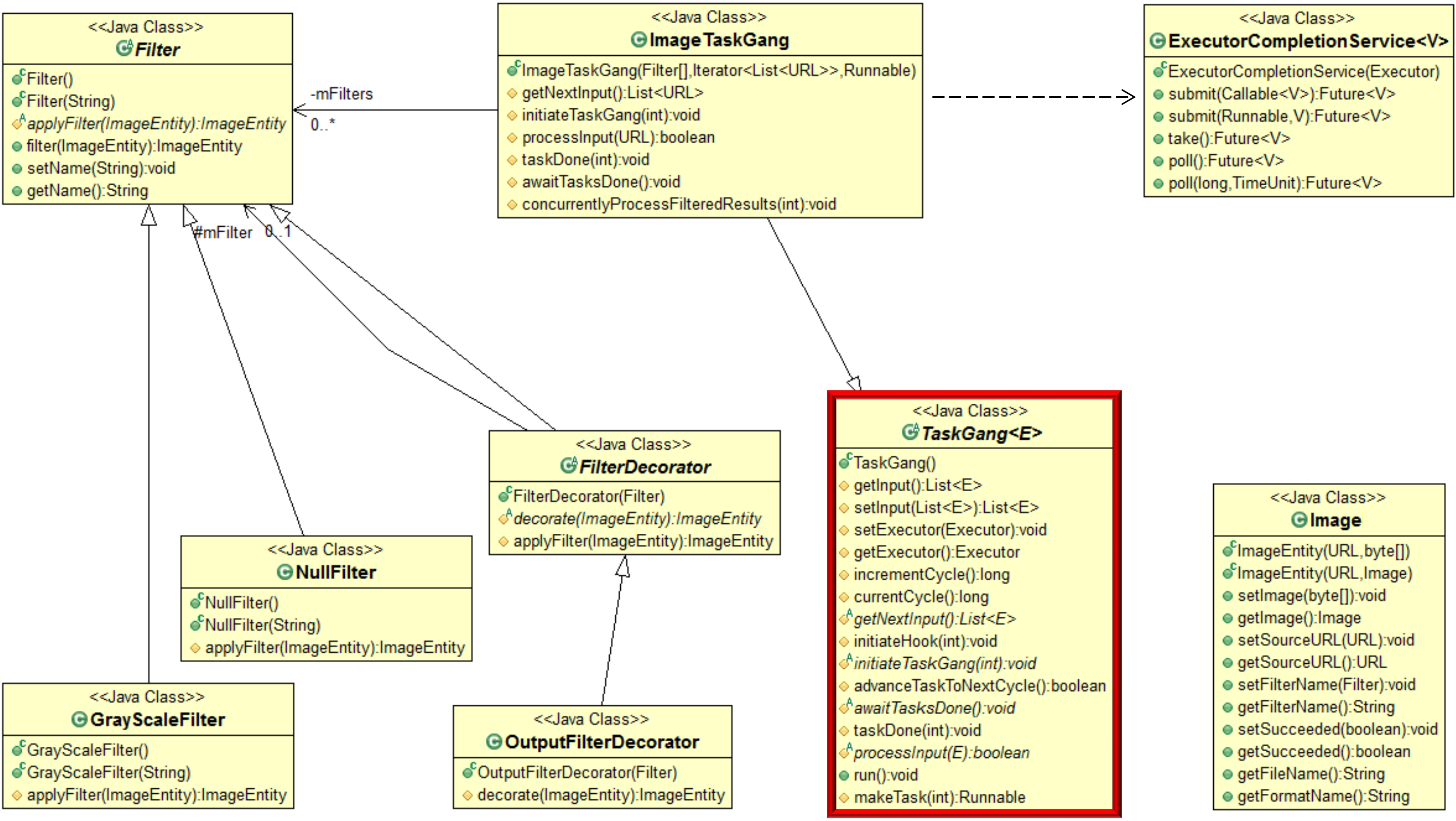

Defines a framework for spawning & running a "gang" of tasks that concurrently process input from a generic list

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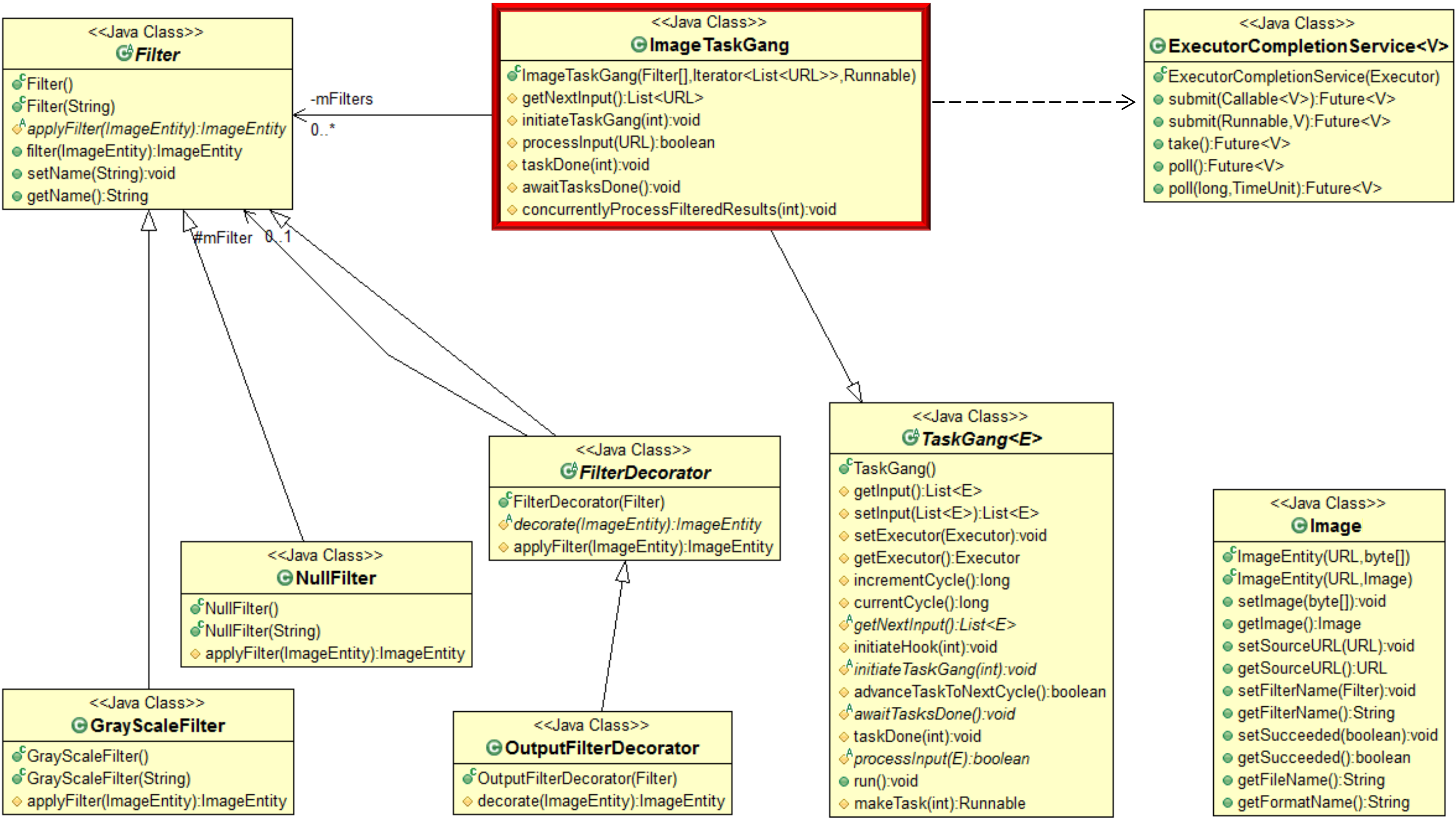

This class customizes the TaskGang framework for image processing

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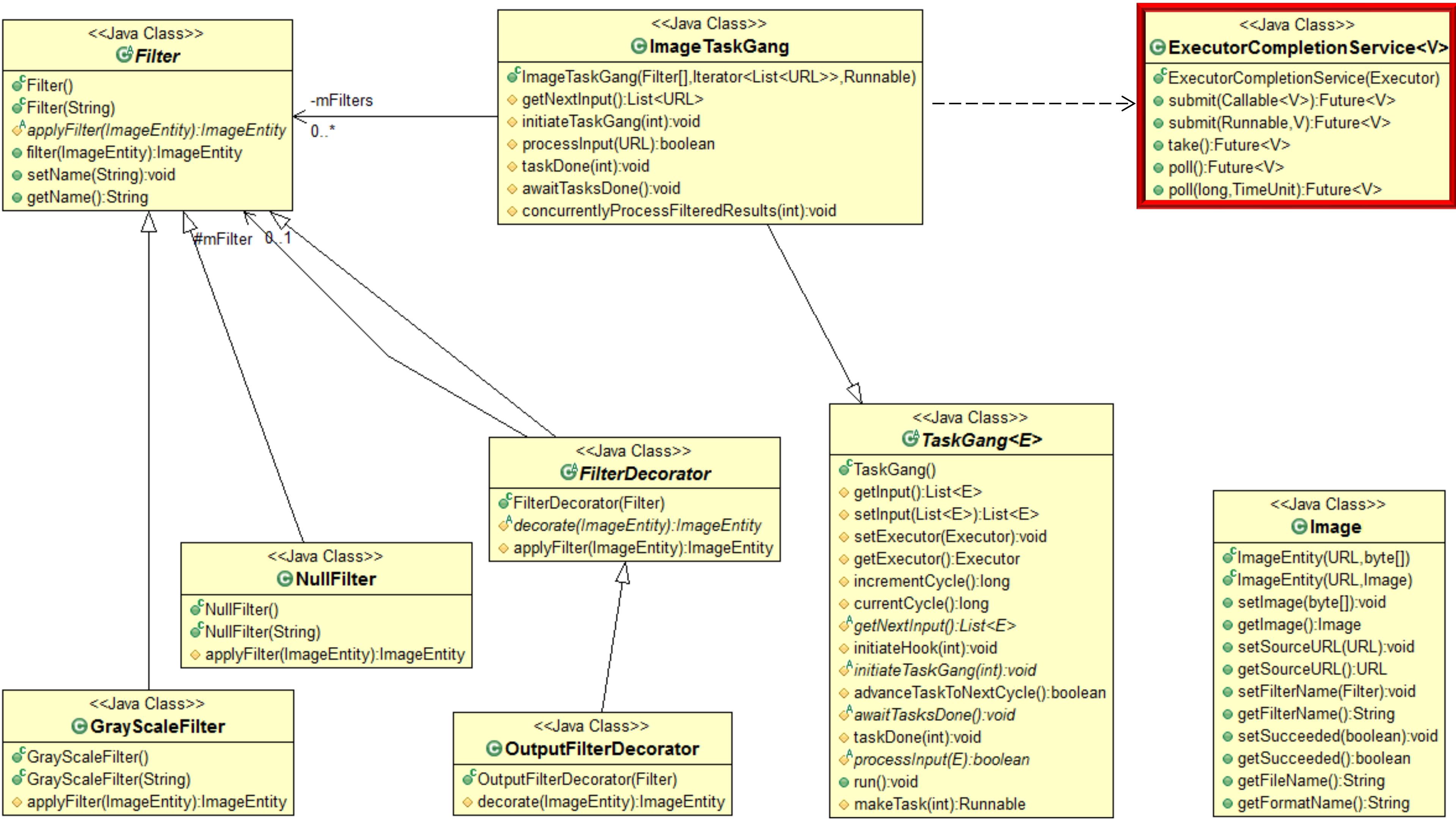

This concurrent Java class can be used to implement the *Proactor* pattern

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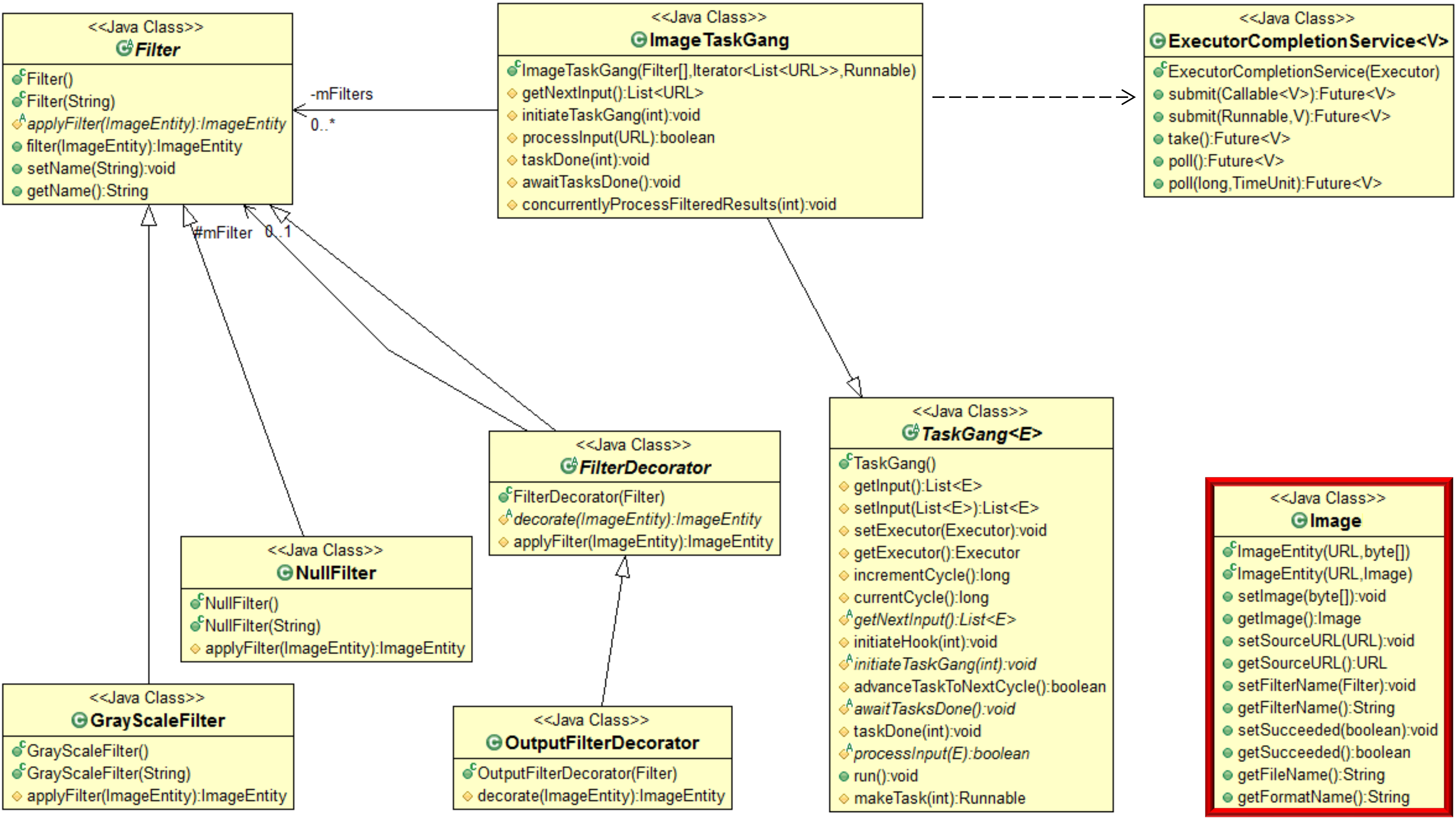

This class stores meta-data about an image & enables image processing

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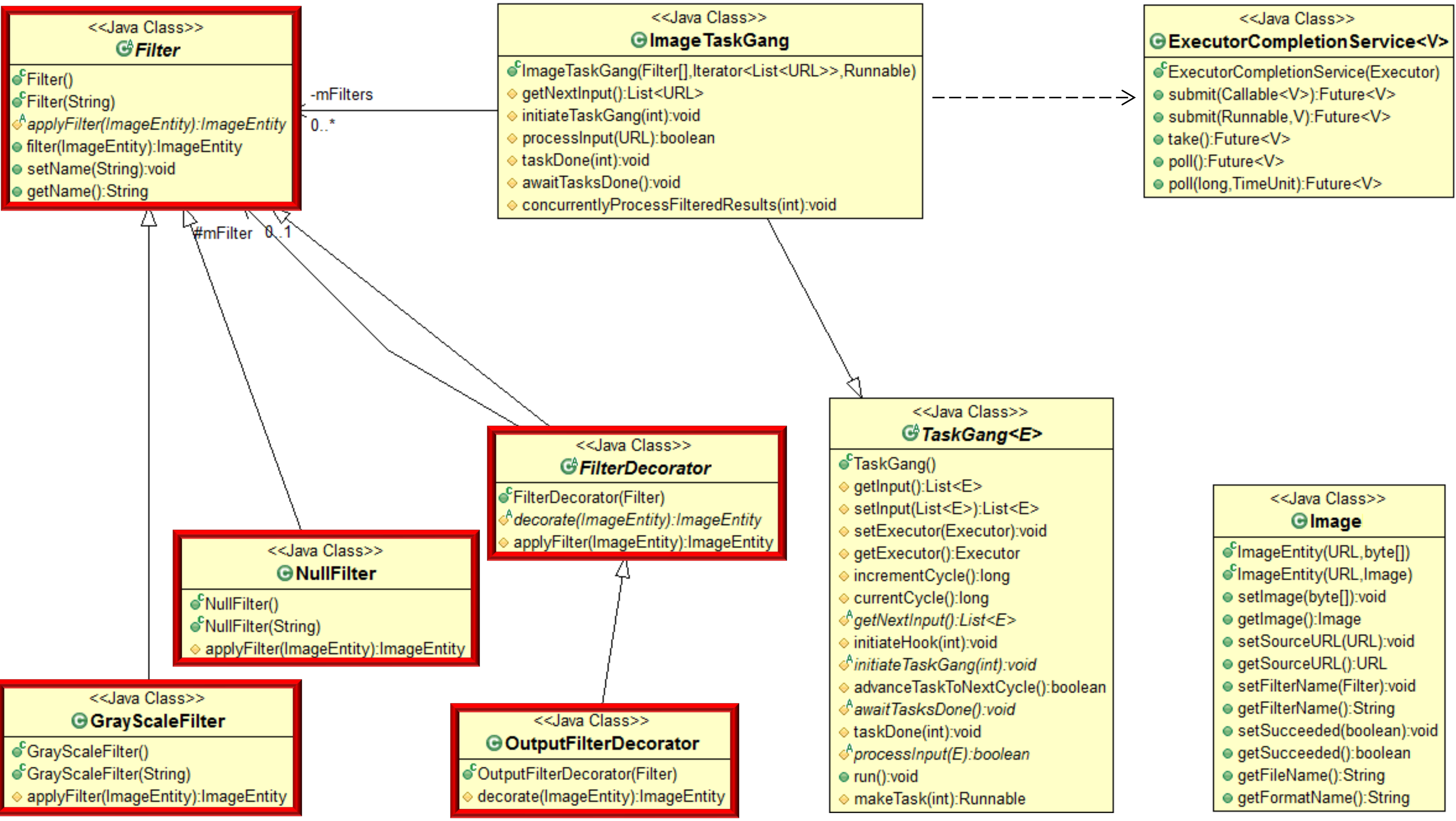

These classes implement image filters via the *Decorator* pattern

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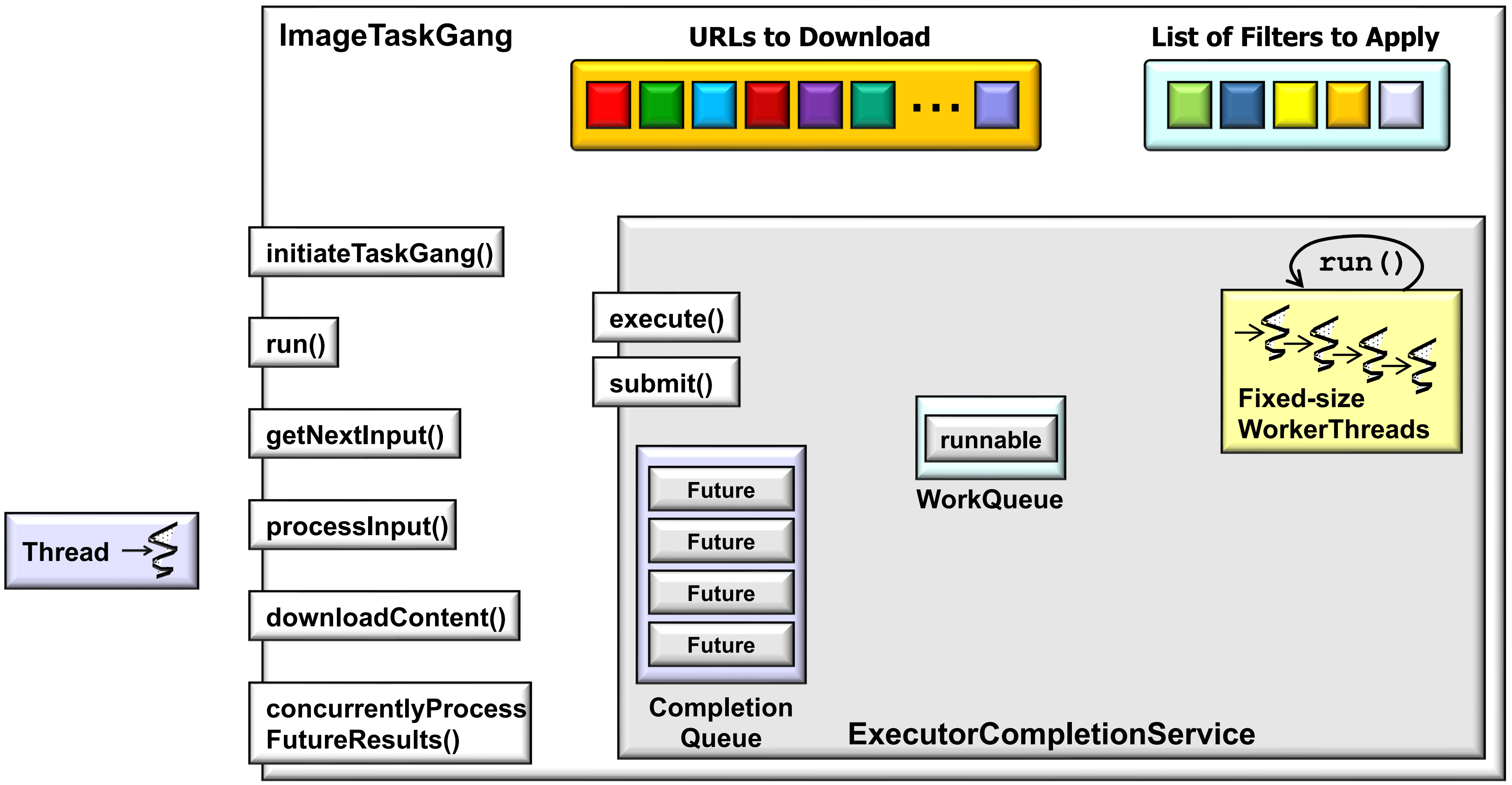
- Object interaction diagram for the ImageTaskGang application



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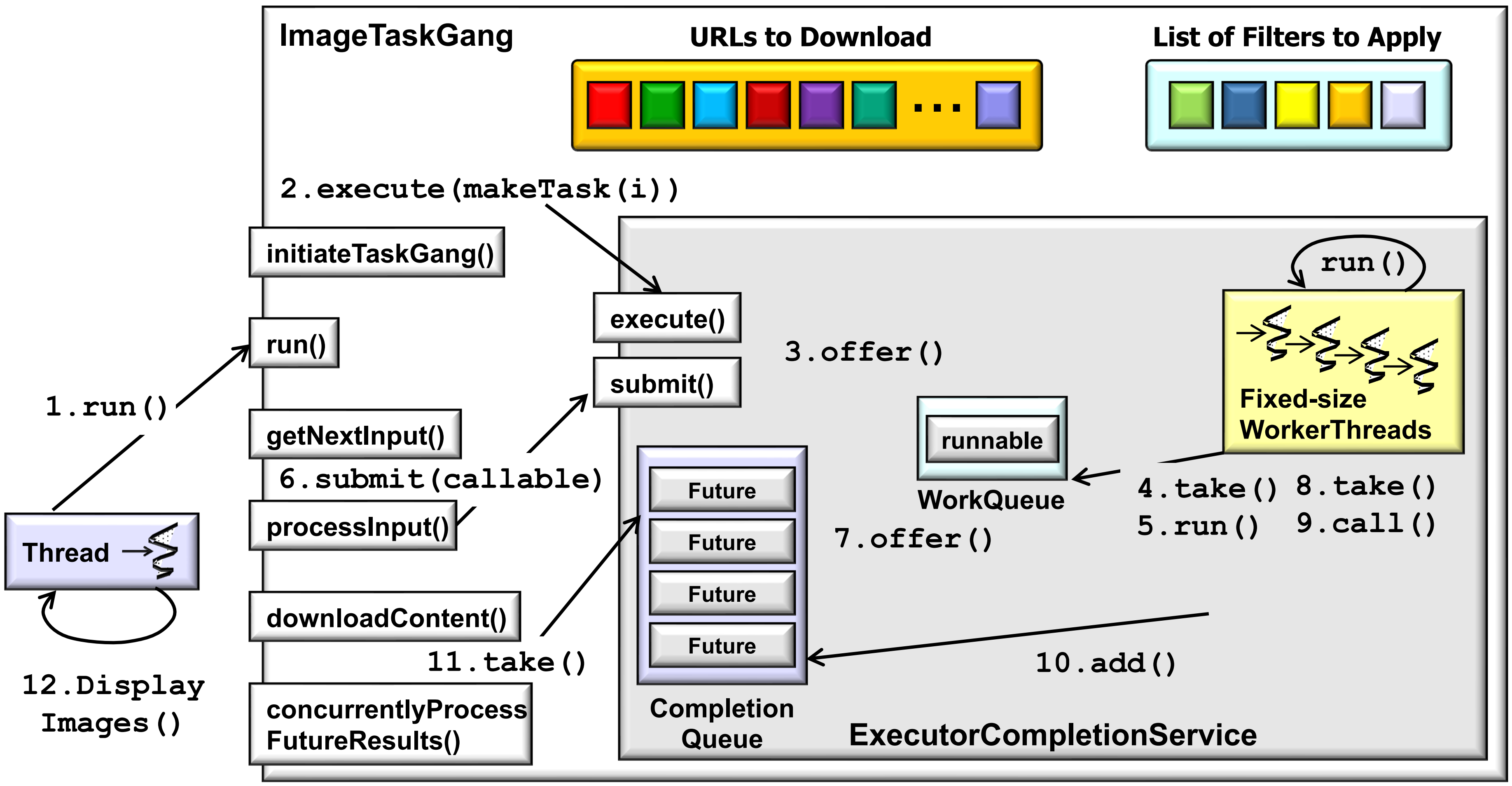

Shows the steps used by the ImageTaskGang application to download, process, store, & display images from web servers

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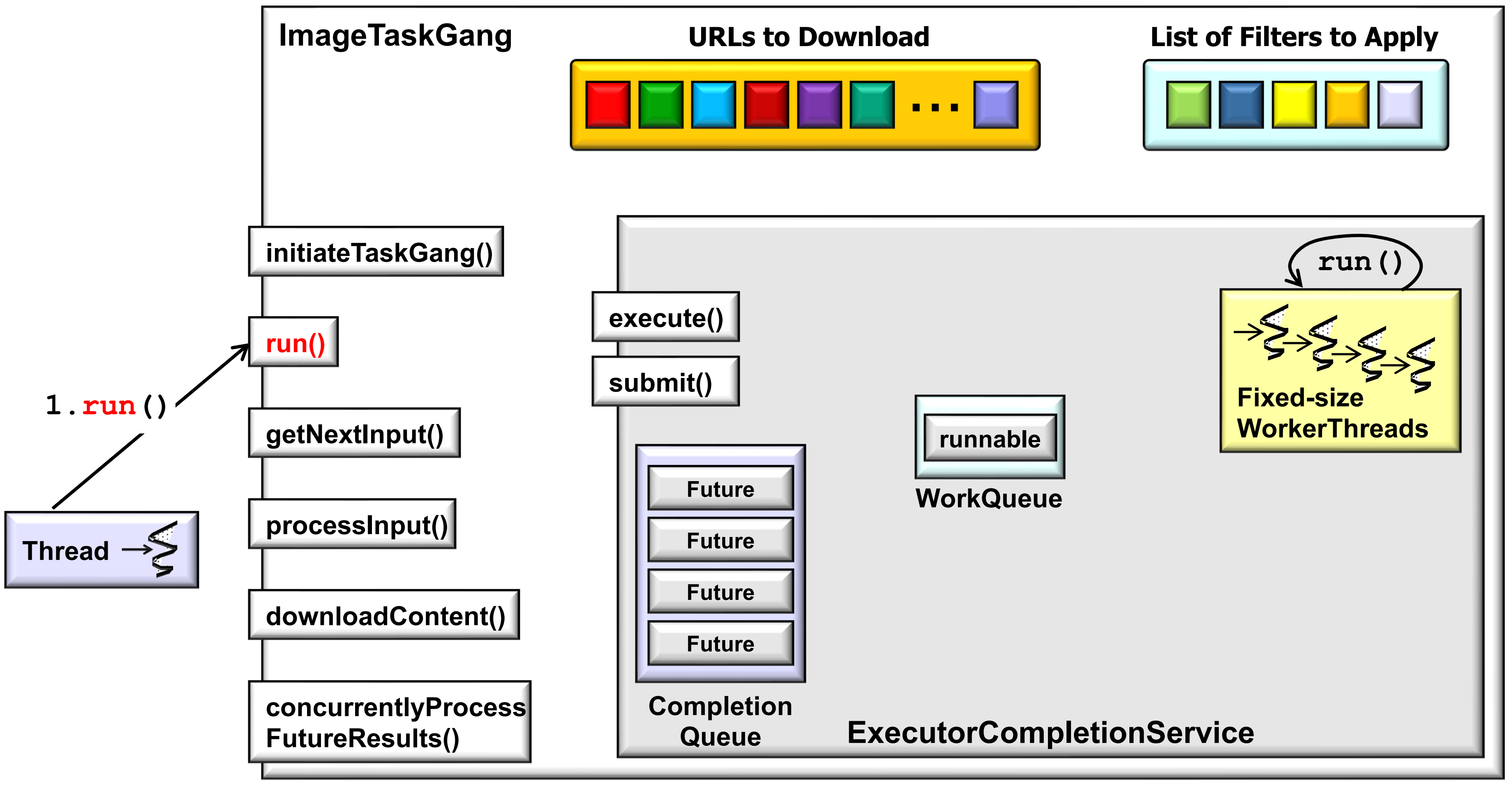

The ImageTaskGang run() hook method obtains the list of URLs & creates Runnables to process them concurrently via Java's ExecutorCompletionService

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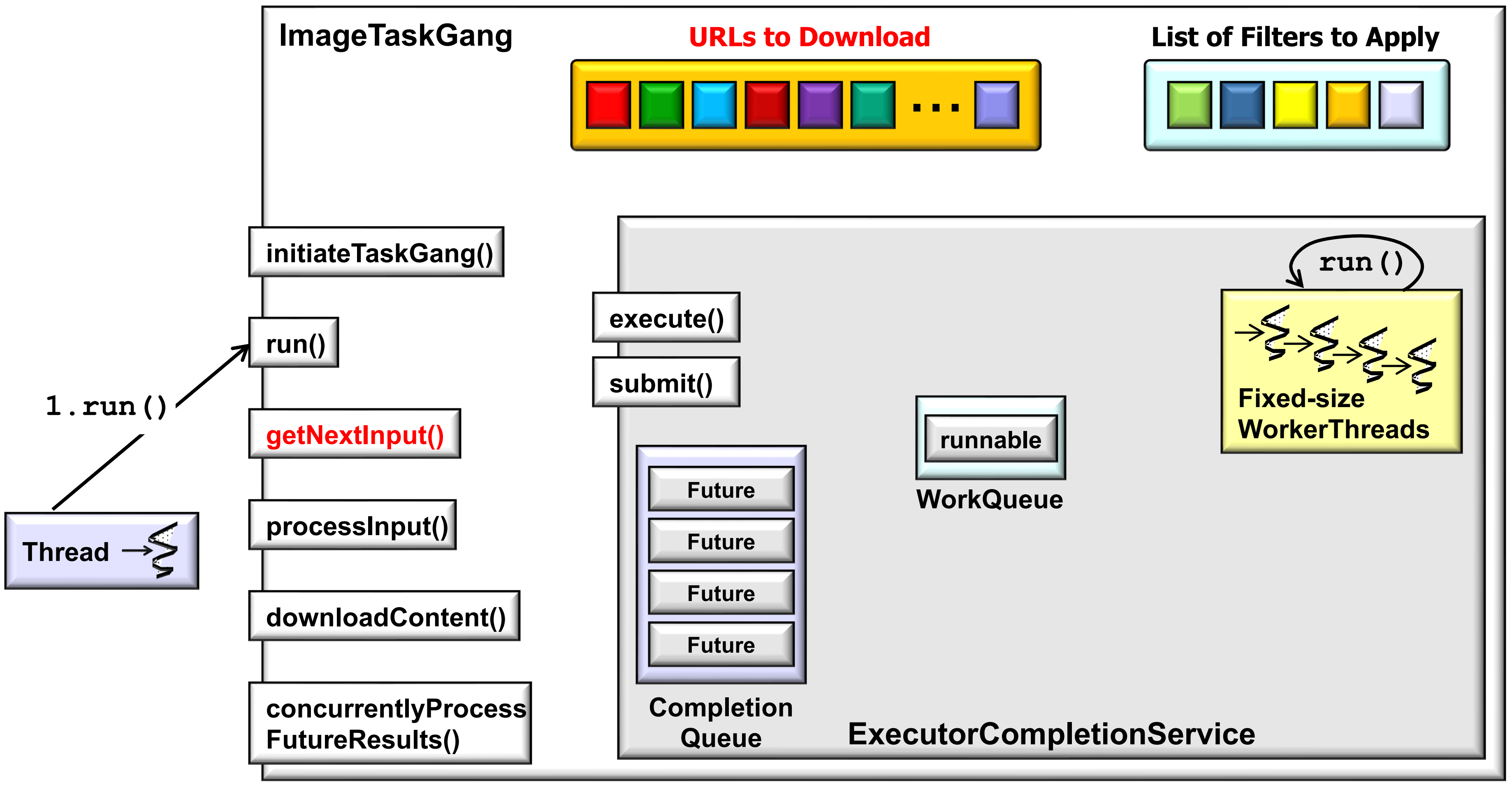

getNextInput() retrieves the next tranche of URLs to download concurrently

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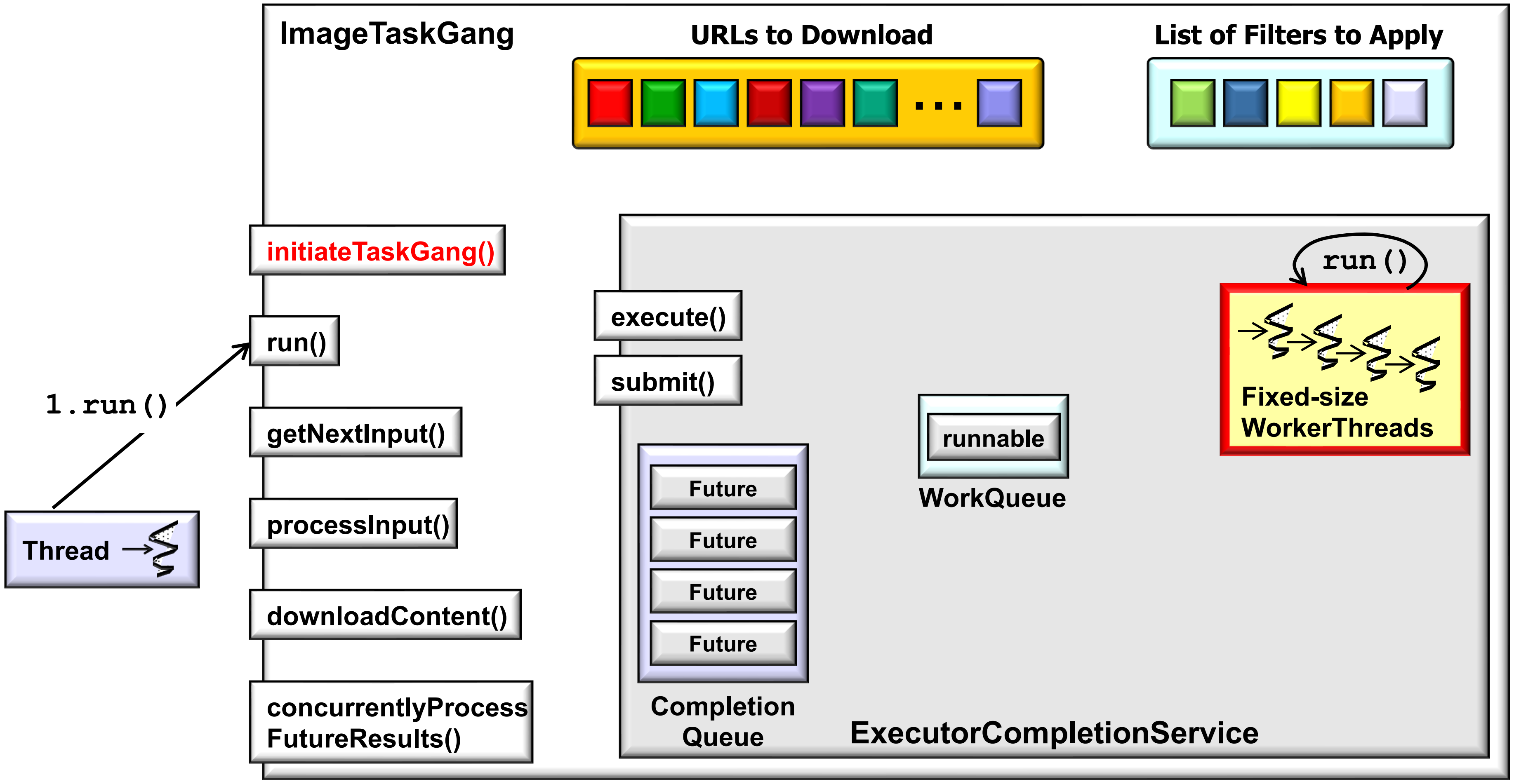

initiateTaskGang() creates the designated type of thread pool

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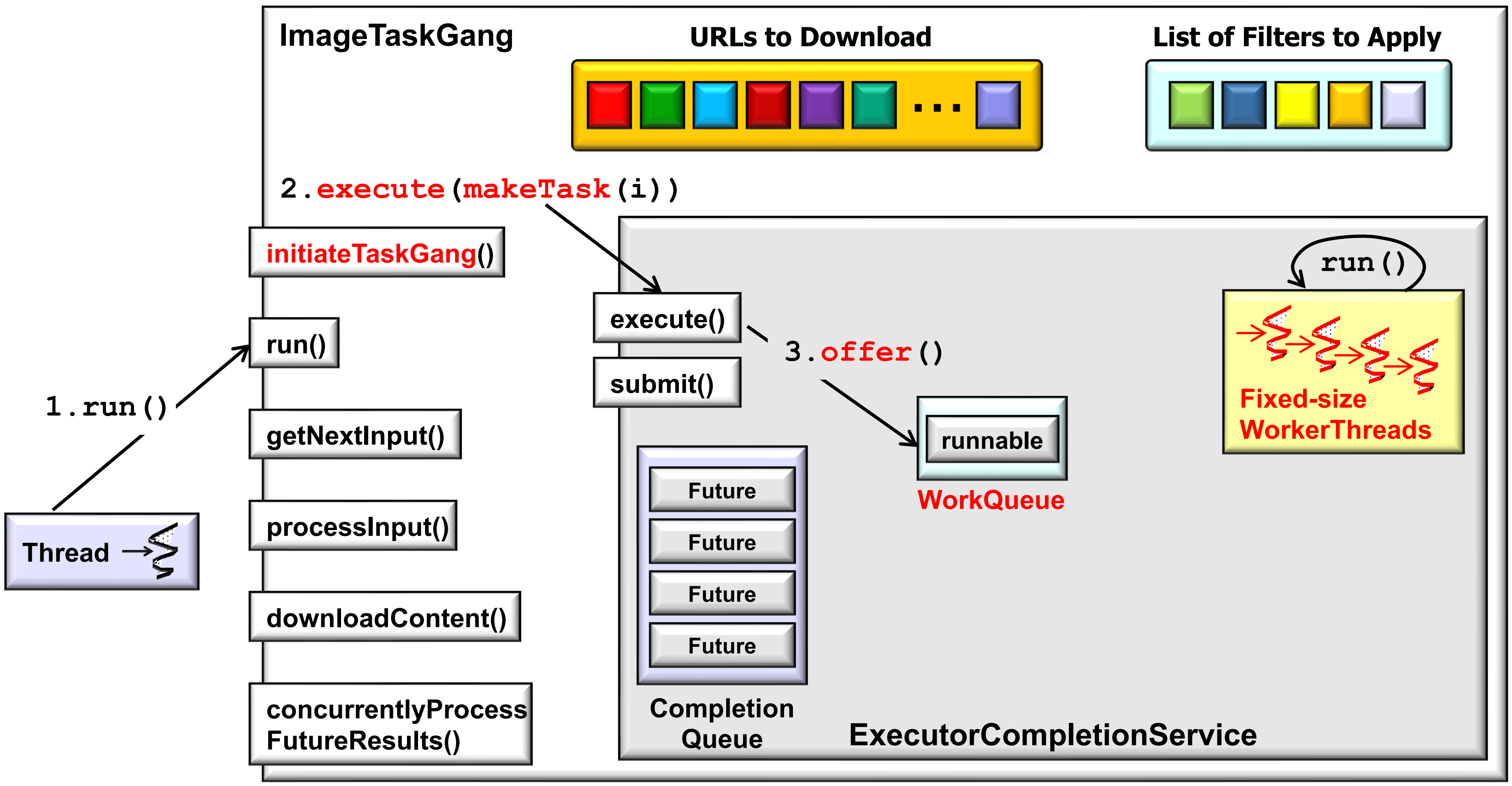

A Runnable task is the created & scheduled to run via a fixed-size thread pool's work queue

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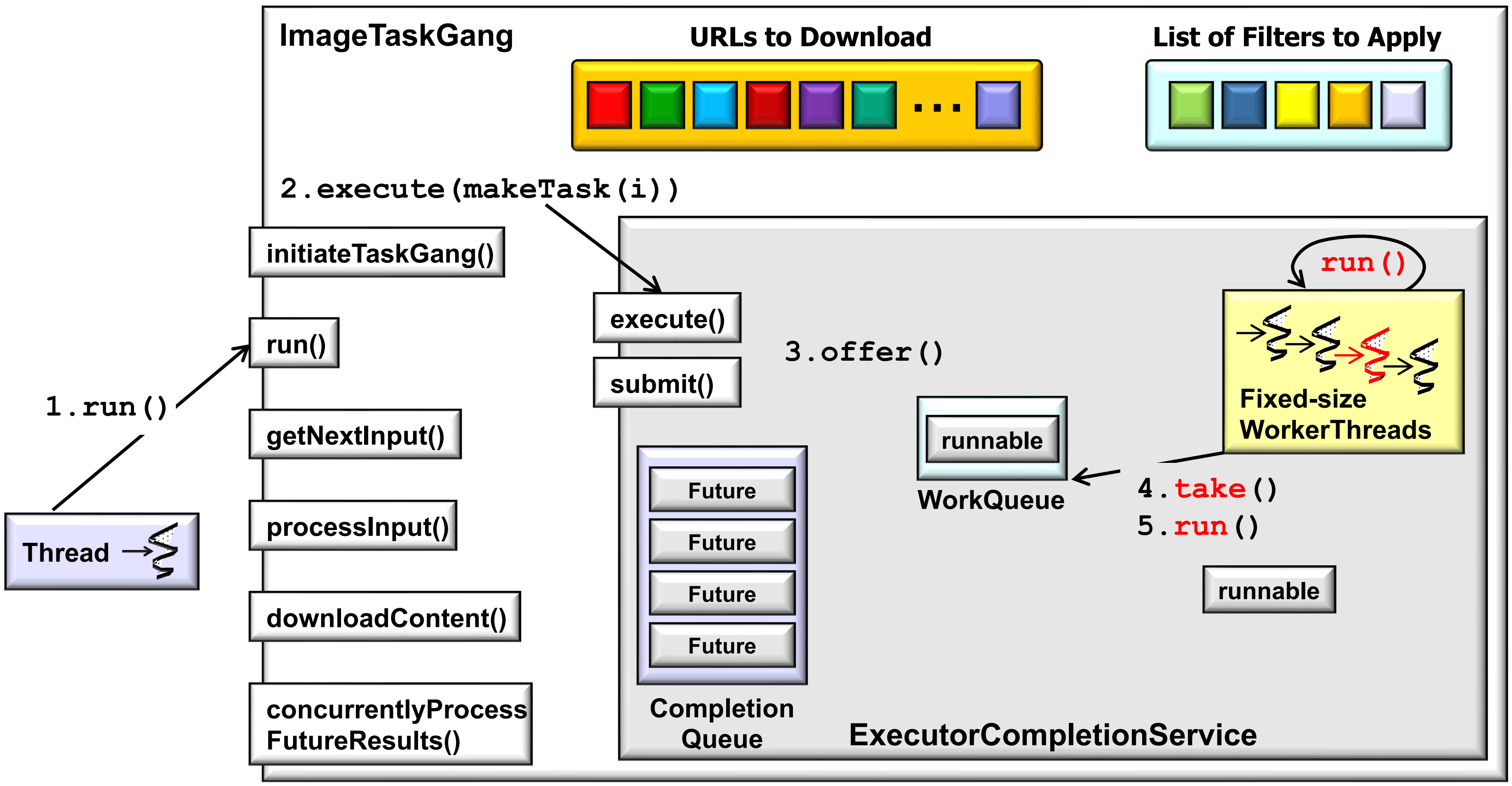

One thread in that fixed-sized thread pool deques the task & runs it

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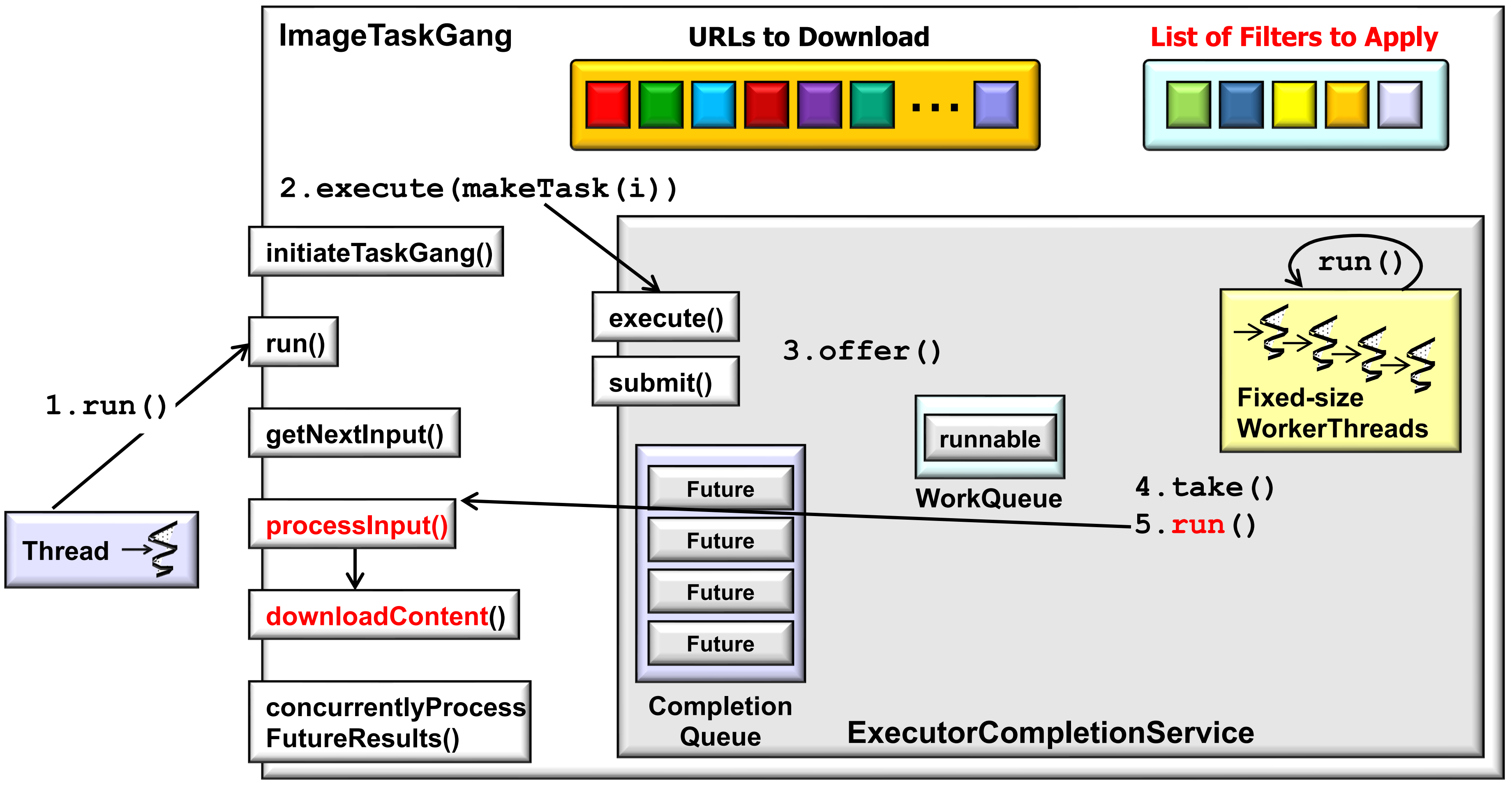

A worker thread's run() hook method calls ImageTaskGang processInput(), which concurrently downloads each image & applies a list of filters to it

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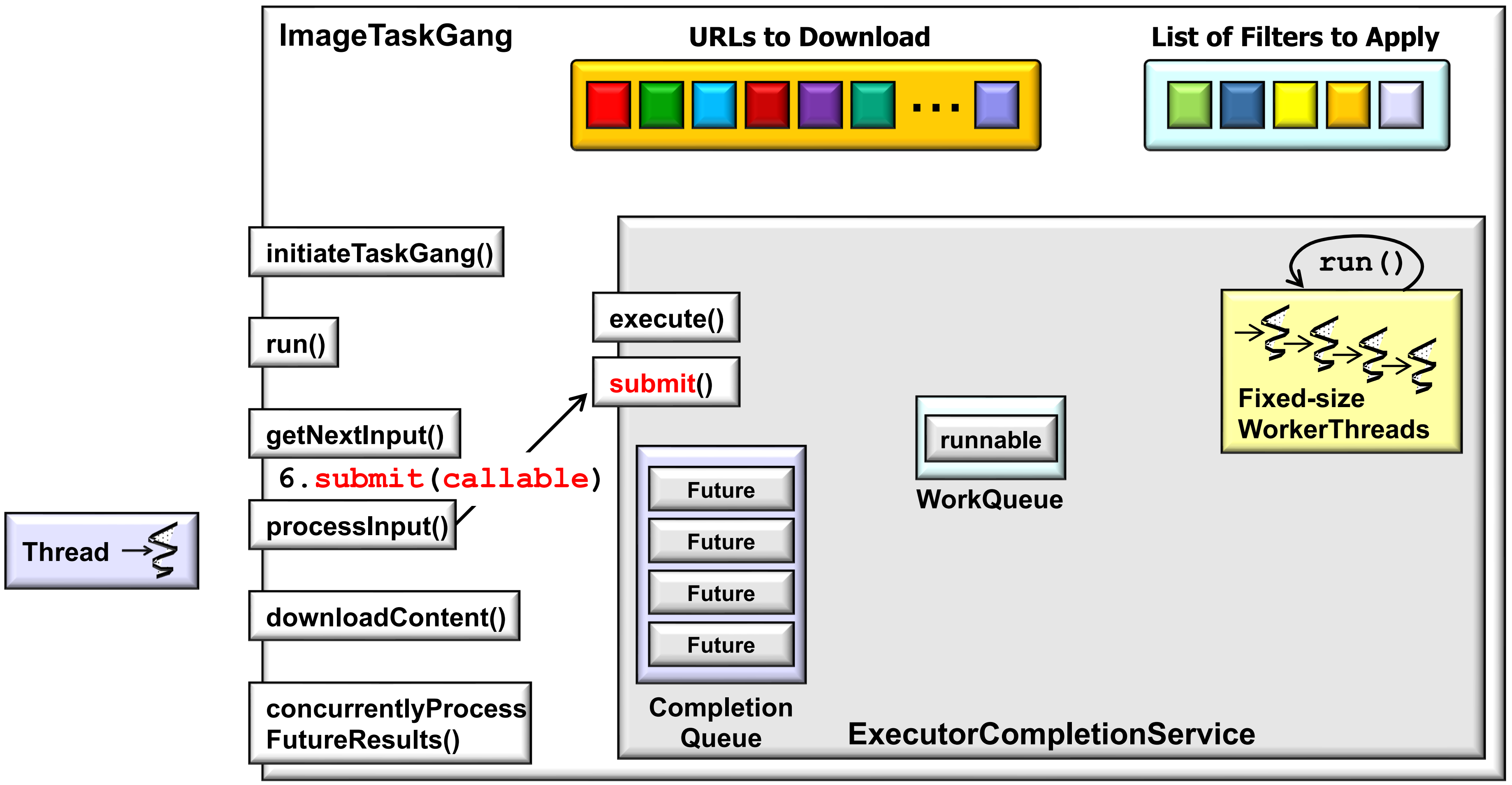

Each filter operation is submitted to the Java ExecutorCompletionService as a callable lambda expression that will run asynchronously in the thread pool

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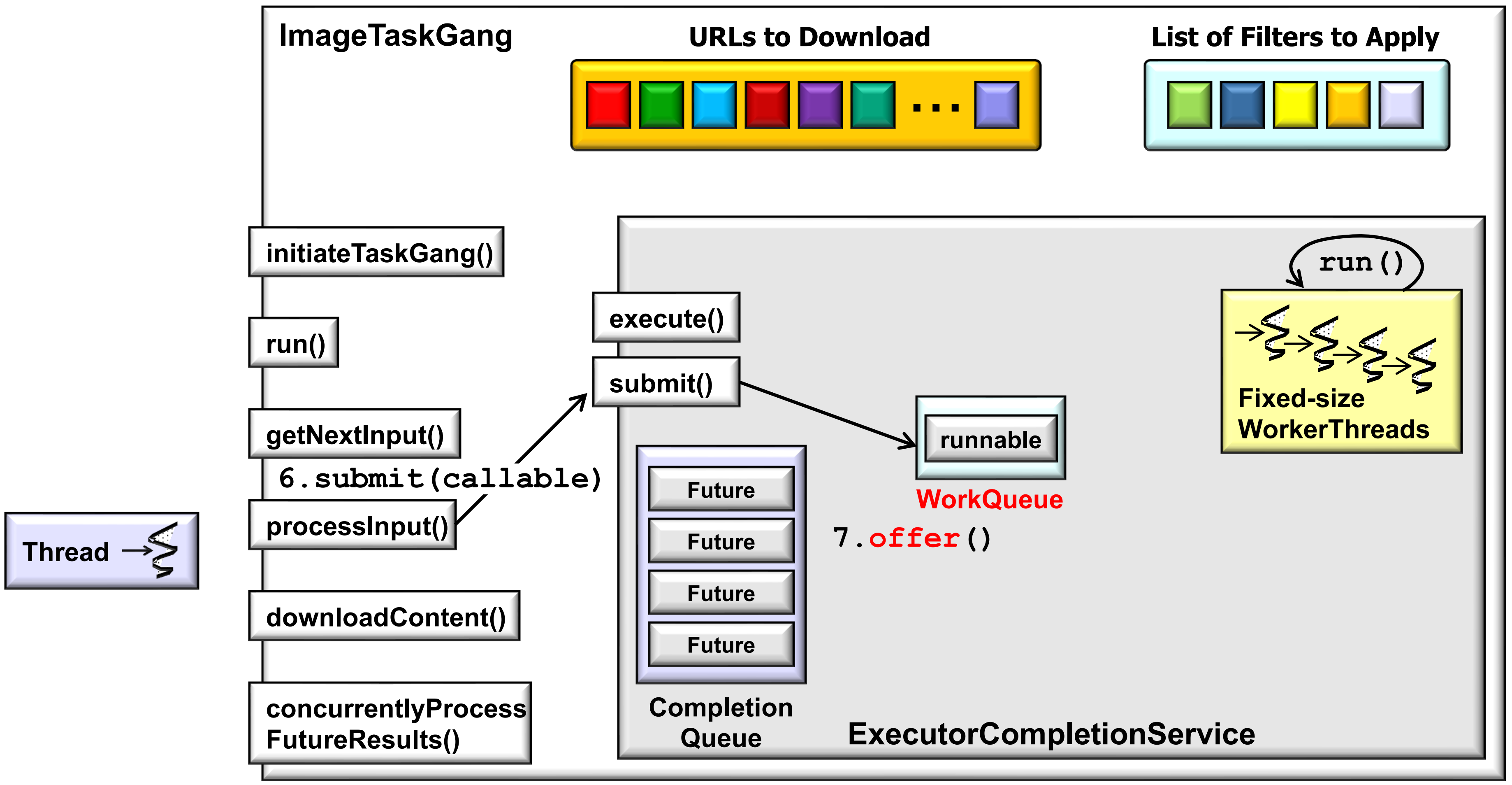

A filter operation is also scheduled to run via the fixed-sized thread pool's work queue

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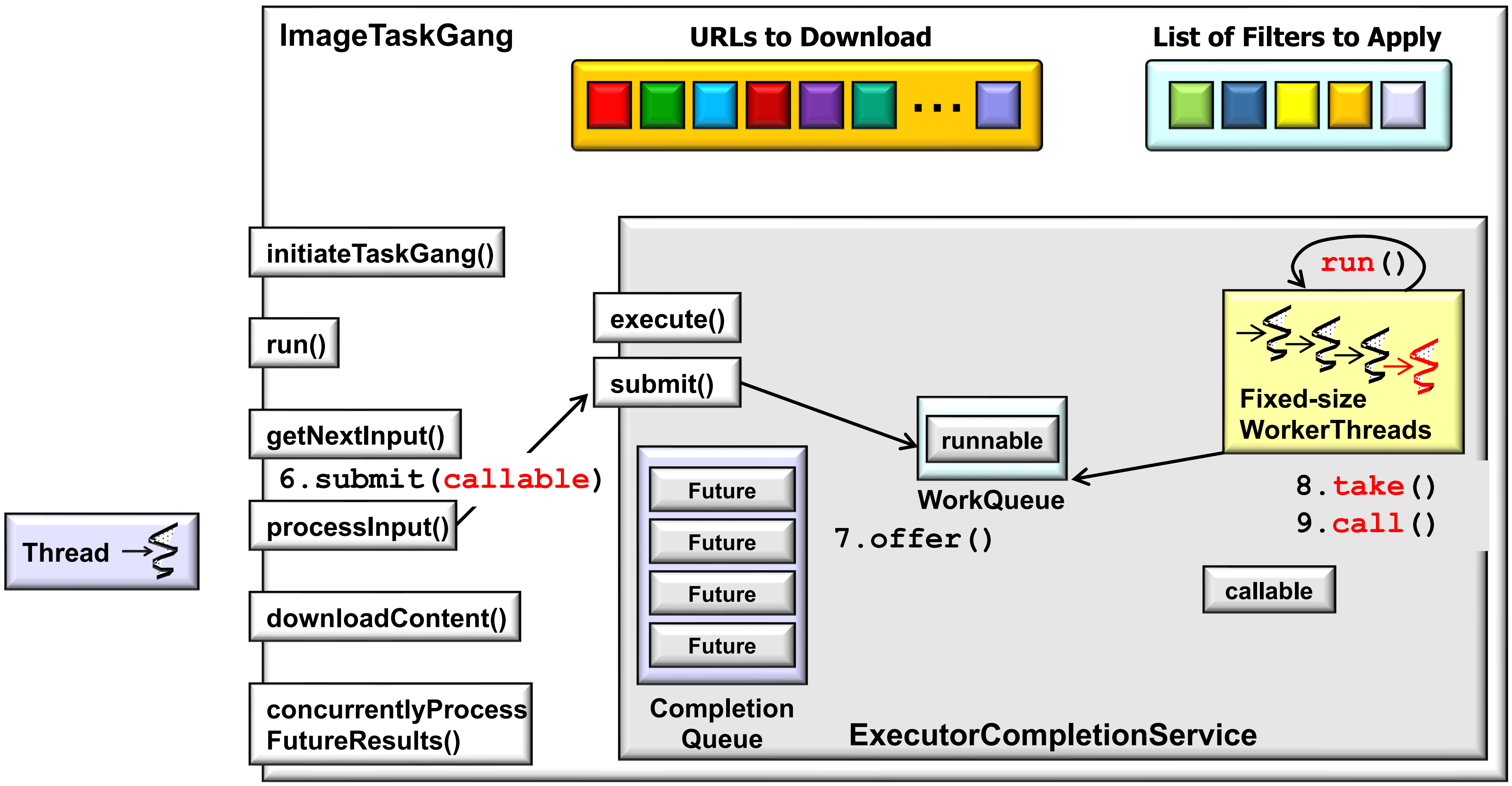

A worker thread's run() hook method invokes the lambda's call() hook method, which filters the downloaded image & stores it in a local file

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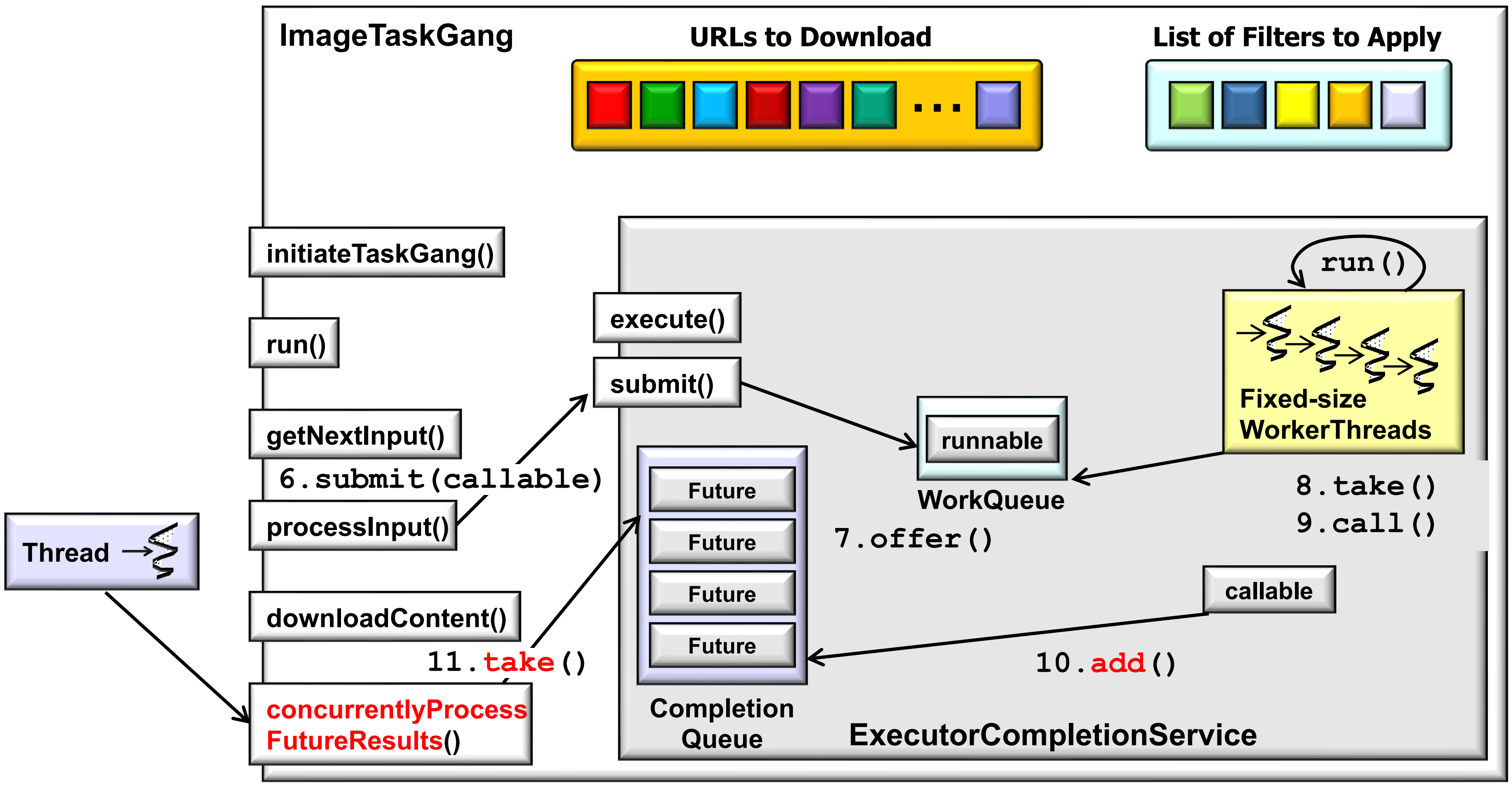

The results of completed callable lambdas are queued & processed by the main thread

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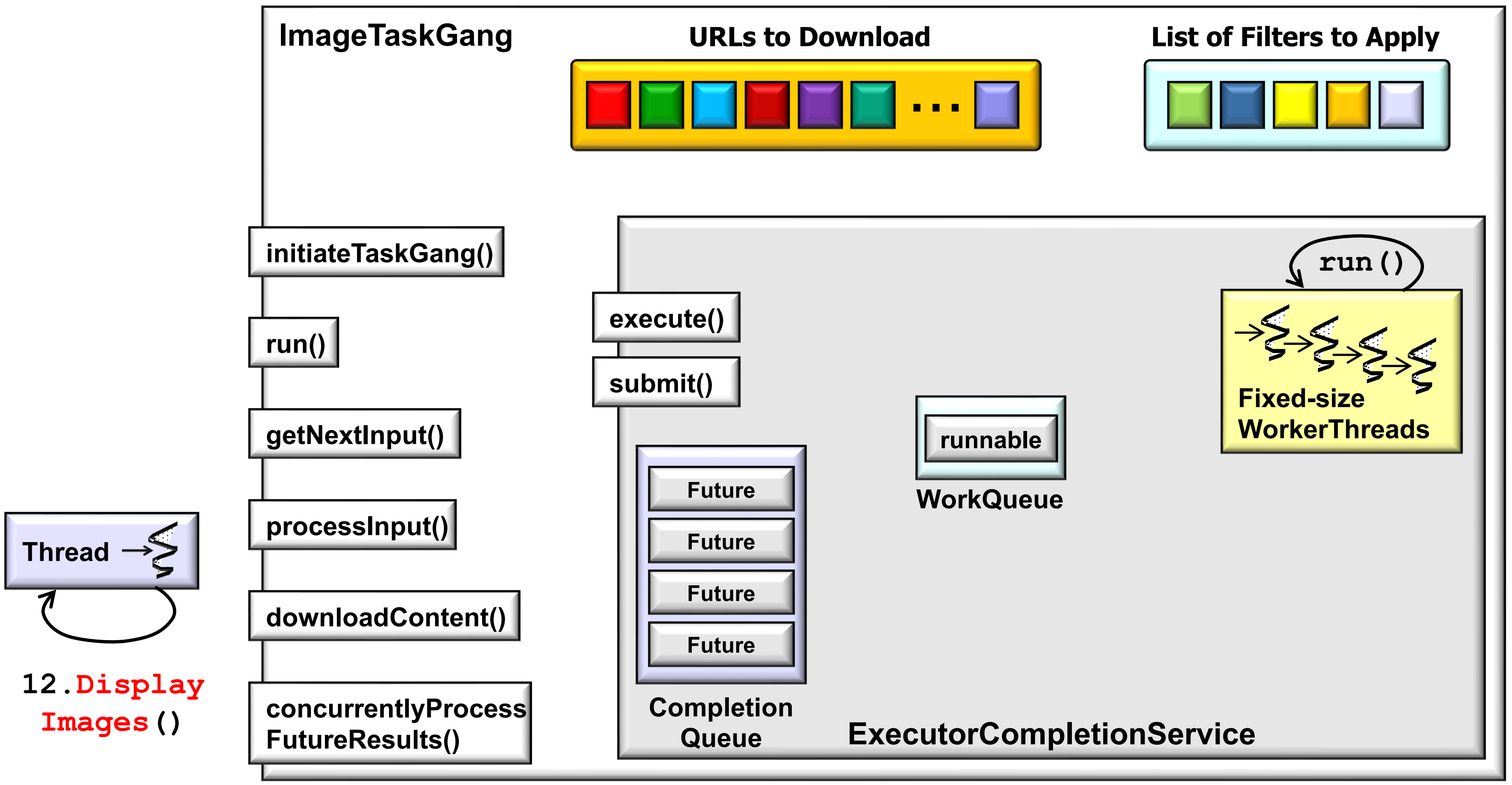

The main thread also triggers the displaying of images to the user after they are processed asynchronously

End of Structure & Dynamics of the Image TaskGang Application